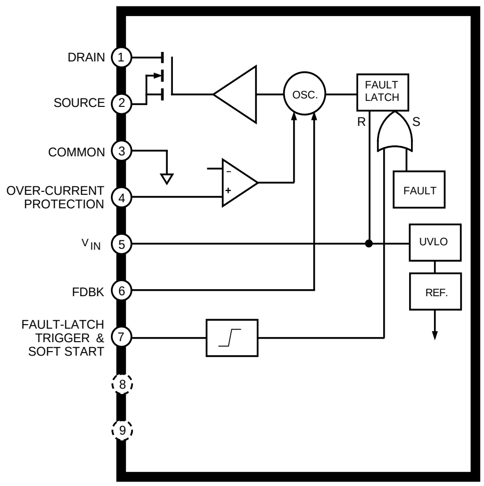
INTERIM DATA SHEET
(Subject to change without notice)
August 18, 1994

STR-S6513

OFF-LINE SWITCHING REGULATOR – WITH POWER MOSFET OUTPUT



Dwg. PK-002-2

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{IN} .... **35 V**

Drain-Source Voltage, V_{DS} .... **400 V**

Continuous Drain Current, I_D .... **10 A**

1 ms Single-Pulse Drain Current, I_{DM} .... **40 A**

Single-Pulse Avalanche Energy, E_A .... **400 mJ**

Soft-Start/Fault-Latch Trigger Voltage, $V_{SS/FL}$ .... **10 V**

Feedback Input Current, I_{FDBK} .... **20 mA**

Over-Current Protection Voltage, V_{OCP} .... **3.5 V**

Insulation Voltage, $V_{WM(RMS)}$ .... **2000 V**

Package Power Diss., P_D .... **See Graph**

FET Junction Temperature, T_J ...... **+150°C**

Internal Frame Temperature, T_F ... **+125°C**

Operating Temperature Range, T_A .... **-20°C to +125°C**

Storage Temperature Range, T_{stg} .... **-40°C to +125°C**

The STR-S6513 is specifically designed to meet the requirement for increased integration and reliability in off-line flyback converters operating in the quasi-resonant ringing choke mode. The device incorporates the primary control and drive circuit with a discrete avalanche-rated power MOSFET.

Crucial system parameters such as maximum ON time and OFF time are fixed during manufacture. Local control circuit decoupling and layout are optimized within the device.

Cycle-by-cycle current limiting, soft start, under-voltage lock-out with hysteresis, over-voltage protection, and thermal shutdown protect the device during all normal and overload conditions. Over-voltage protection, thermal shutdown, or an external fault signal are latched. The dual requirements of dielectric isolation and low transient thermal impedance and steady-state thermal resistance are satisfied in an over-molded single-in-line power package.

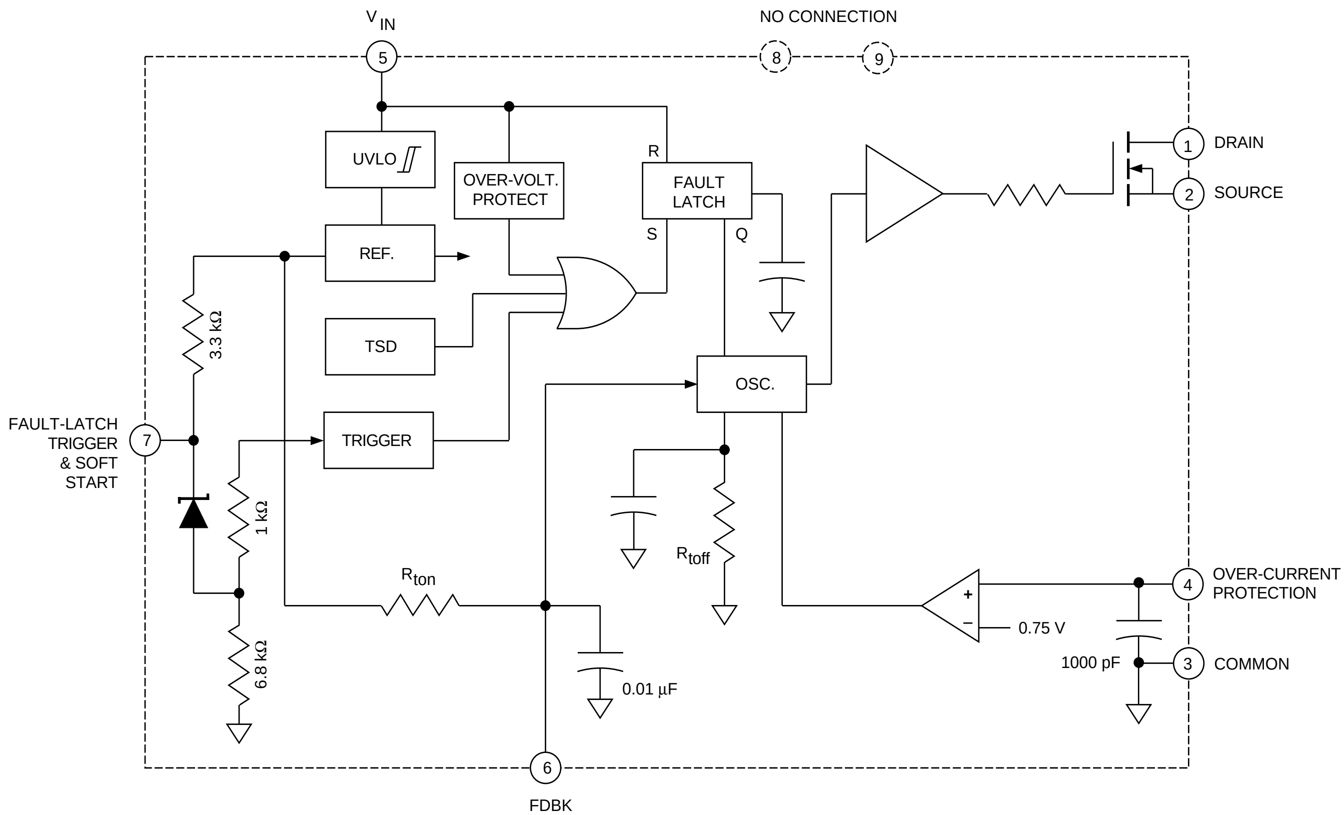
Proven in substantial volumes, this device and its fixed-frequency counterparts represents a significant advance in off-line SMPS reliability growth and integration. A similar off-line switching regulator, with an output rating of 600 V at 6 A, is also available.

FEATURES

- Quasi-Resonant Ringing Choke Converter
- Avalanche-Rated Power MOSFET Switch
- Pulse-by-Pulse Current Limiting
- Latched Over-Voltage and Thermal Protection
- Maximum ON Time and OFF Time Set During Manufacture
- Internal Under-Voltage Lockout with Hysteresis
- Over-Molded SIP with Integral Isolated Heat Spreader

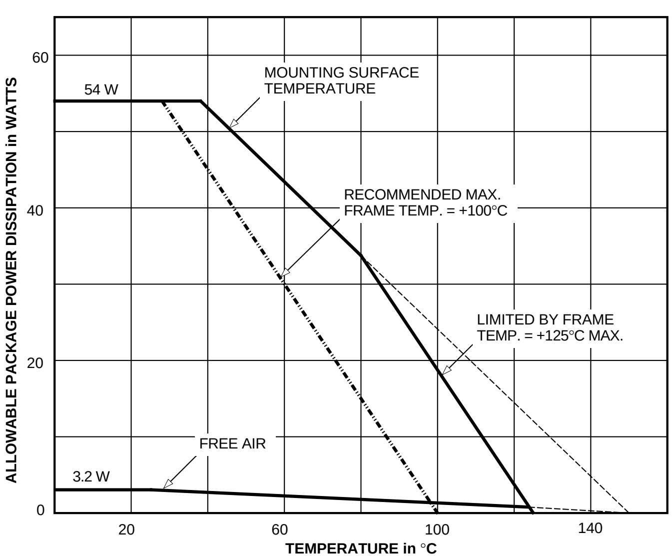
Always order by complete part number: **STR-S6513** .

FUNCTIONAL BLOCK DIAGRAM



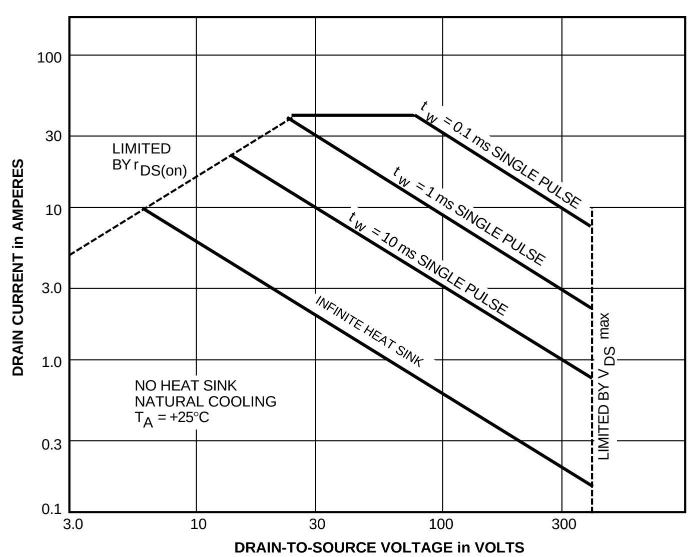
Dwg. FK-002-3

ALLOWABLE PACKAGE POWER DISSIPATION



Dwg. GK-003-2

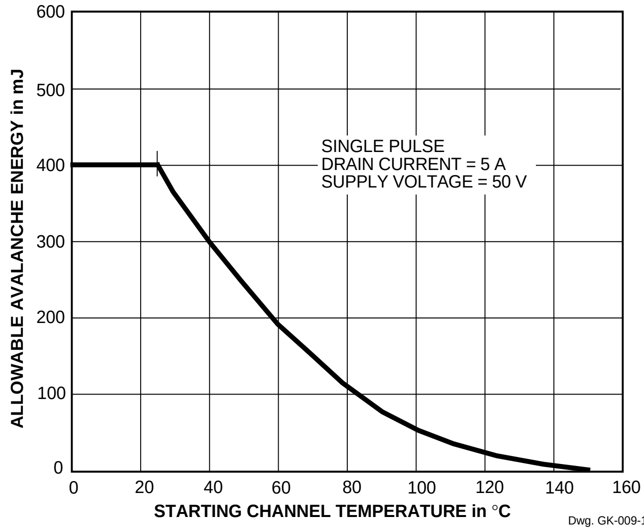
MAXIMUM SAFE OPERATING AREA



Dwg. GK-004-3

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ALLOWABLE AVALANCHE ENERGY



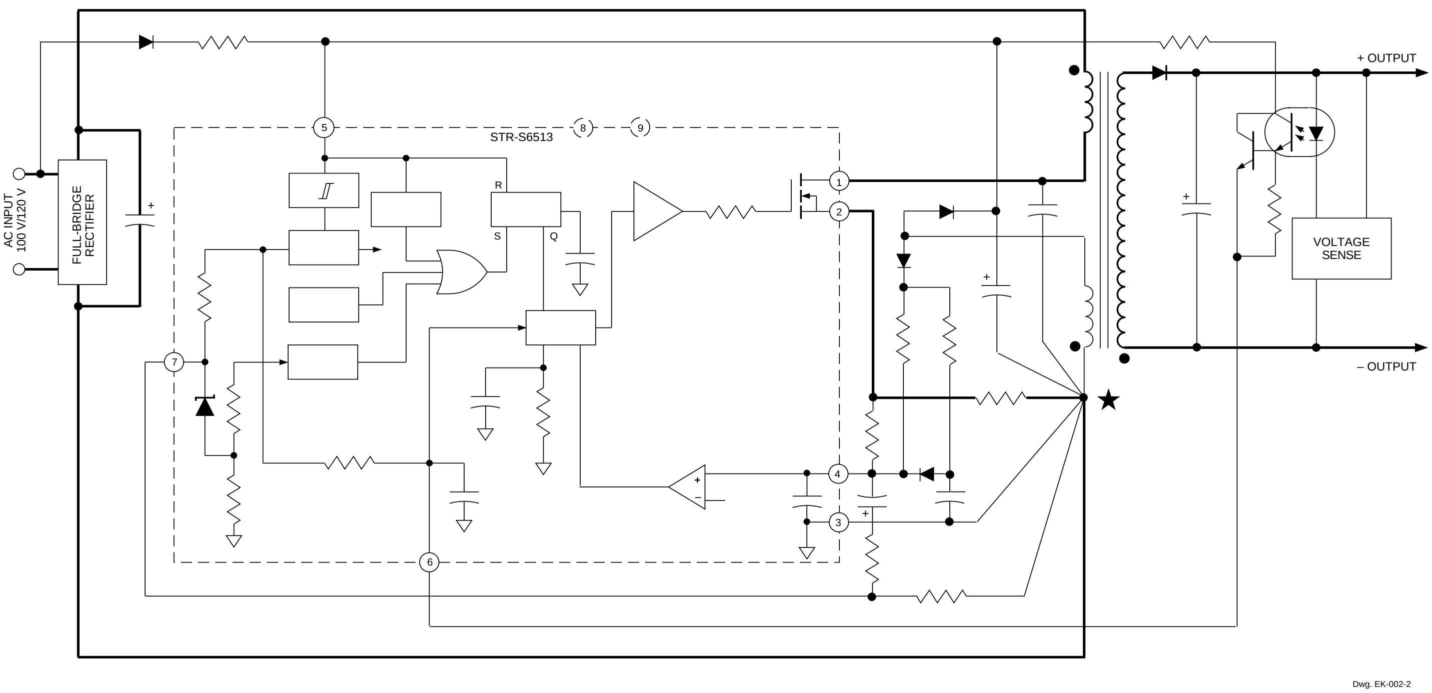
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{IN} = 18 V, voltage measurements are referenced to Common (pin 3) (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits Min.	Limits Typ.	Limits Max.	Units
On-State Voltage	V_{INT}	Turn-on, increasing V_{IN}	14.4	–	17.6	V
Under-Voltage Lockout	V_{INQ}	Turn-off, decreasing V_{IN}	9.0	–	11	V
Over-Voltage Threshold	$V_{OVP(th)}$		26	–	31	V
FET Leakage Current	I_{DSS}	V_{DS} = 400 V	–	–	300	µA
FET ON Resistance	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 5.5 A	–	0.45	0.58	Ω
Output Fall Time	t_f	V_{DD} = 200 V, I_D = 5 A, 10% to 90% V_{DS}	–	–	250	ns
Maximum ON Time	t_{on}		18	–	22	µs
Minimum OFF Time	t_{off}		0.6	–	1.6	µs
Over-Current Threshold	$V_{OCP(th)}$		700	–	800	mV
Feedback Threshold	$V_{FDBK(th)}$		–	750	–	mV
Soft-Start Current	I_{SS}	V_{SS} = 0 V	-2.2	–	-3.4	mA
Fault-Latch Threshold Volt.	$V_{FL(th)}$		6.9	–	7.7	V
Fault-Latch Holding Current	I_{INH}	V_{IN} reduced to 8.5 V	–	340	400	µA
Fault-Latch Reset Voltage	V_{INQ}	I_{IN} <20 µA, V_{IN} reduced from 31 V	6.5	–	8.5	V
Insulation RMS Voltage	$V_{WM(RMS)}$	All terminals simultaneous reference metal plate against backside	2000	–	–	V
Supply Current	$I_{IN(ON)}$	Operating	18	–	28	mA
	$I_{IN(OFF)}$	Start up, V_{IN} =14 V	–	–	100	µA
Thermal Shutdown	T_J		125	150	–	°C
Thermal Resistance	$R_{\theta JM}$	FET junction to mounting surface	–	2.0	–	°C/W

NOTES: Negative current is defined as coming out of (sourcing) the specified device terminal.
Typical Data is for design information only.

TYPICAL APPLICATION

WARNING: lethal potentials are present. See text.



APPLICATIONS INFORMATION

> **WARNING** — These devices are designed to be operated at lethal voltages and energy levels.
> Circuit designs that embody these components must conform with applicable safety requirements.
> Precautions must be taken to prevent accidental contact with power-line potentials.
> Do not connect grounded test equipment.
>
> The use of an isolation transformer is recommended during circuit development and breadboarding.

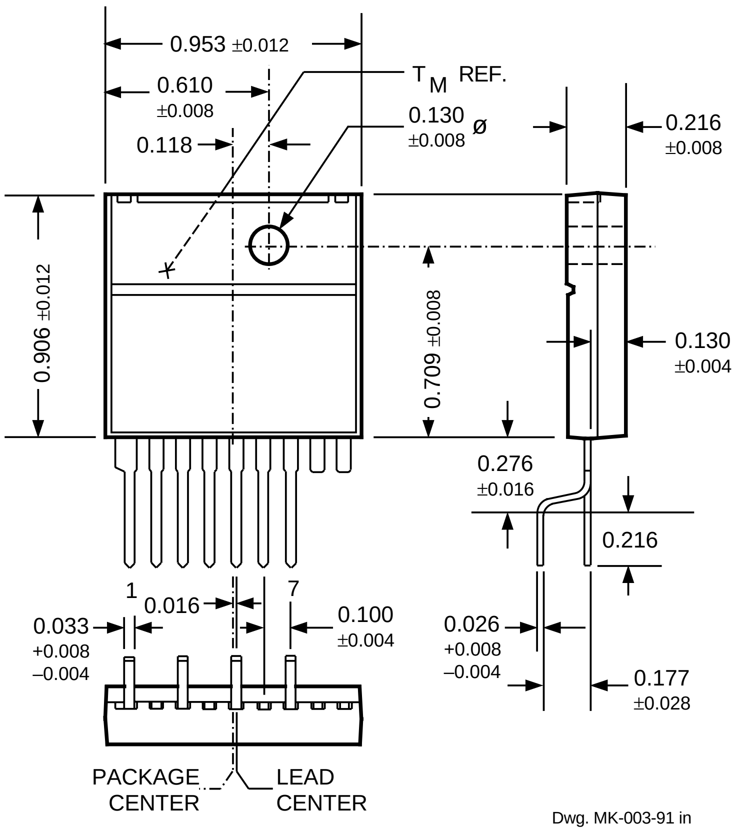
The power MOSFET outputs of these devices are similar to the International Rectifier type IRF740. These devices feature an excellent combination of fast switching, ruggedized device design, low on-resistance, and cost effectiveness.

Recommended mounting hardware torque:
4.34 – 5.79 lbf•ft (6 – 8 kg•cm or 0.588 – 0.784 Nm).

Recommended metal-oxide-filled, alkyl-degenerated oil base, silicone grease:
Dow Corning 340, or equivalent

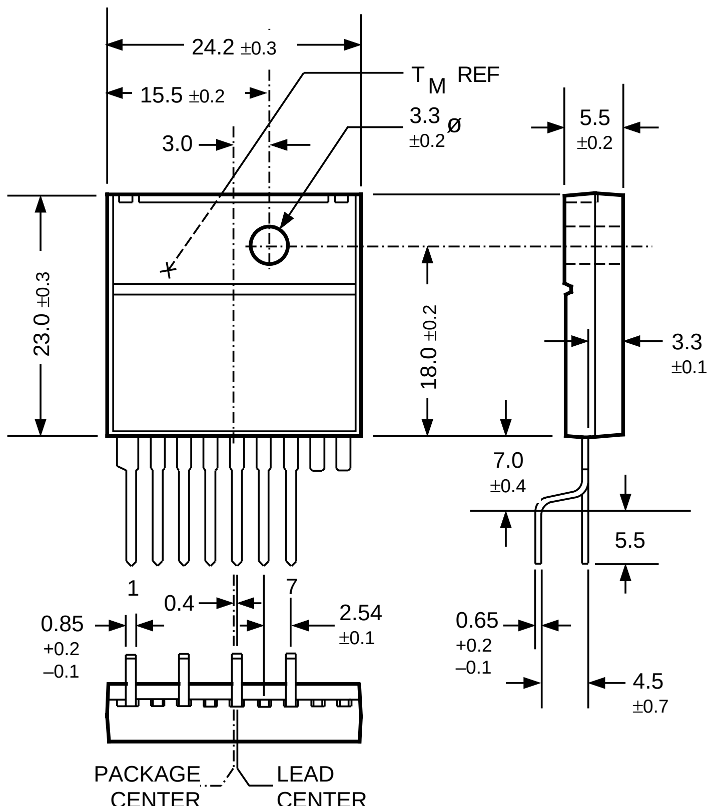
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Dimensions in Inches
(Based on 1 mm = 0.03937")



NOTE: Exact body and lead configuration at vendor's option within limits shown.

Dimensions in Millimeters



Dwg. MK-003-91 mm

Allegro MicroSystems, Inc. reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

The information included herein is believed to be accurate and reliable. However, Allegro MicroSystems, Inc. assumes no responsibility for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

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